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P589 P592 P60X P63Y P630 P692 P693 P694
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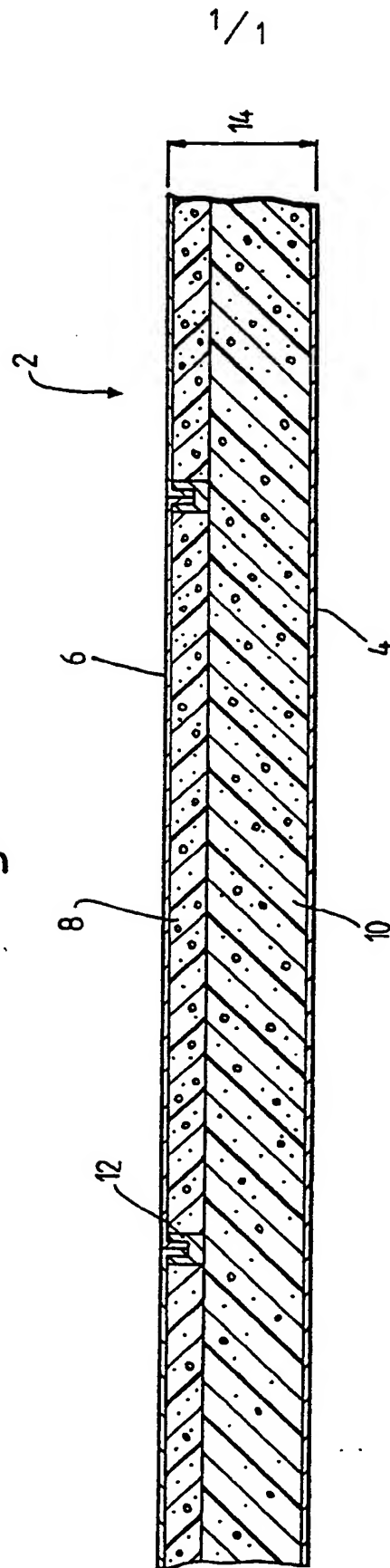
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(54) **Insulated body member**

(57) An insulated body member for a refrigerated vehicle or container comprises a layer of a first insulating material and an outer skin, a layer of second waterproof insulating material being provided between the two.

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.
The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1982.

Fig.1.



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IMPROVEMENTS IN AND RELATING TO THERMALLY
INSULATED CONTAINERS

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This invention relates to thermally insulated containers and, in particular, to the thermally insulated bodies of lorries, trailers, semi-trailers, containers and vans intended to carry goods in a frozen or chilled condition.

In known refrigerated vehicles the walls and/or floor and/or ceiling of the load-carrying area are formed from composite panels either secured together or supported on a metal or wood framework. The panels comprise a layer of insulating material normally sandwiched between two skins. The skins may be formed from plywood or a metal such as aluminium or steel which may, in turn, be covered with a layer of reinforced plastics material. The layer of insulating material is either secured to the two skins by adhesive or it is injected between the two skins in a liquid state. Known insulating materials are foamed plastics materials such as polyurethane, polyvinyl chloride and polystyrene.

A very desirable property of the insulating material is that it should be water resistant so that if the skins are punctured the insulating material does not allow the ingress of water and therefore prevents corrosion and reduction of the insulation of the load-carrying area. However, such material are more

expensive and often difficult to obtain and consequently, despite their advantages, it has not been found practicable to employ them in insulated vehicle bodies.

In accordance with the invention an insulated van body member comprises a composite material having at least three layers, a first layer which defines at least part of the exterior surface of the van body, a second layer of a first insulating material and a third layer of a second insulating material, the second layer being located behind its first and third layers, the first and second insulating materials having similar mechanical behaviour characteristics and the first insulating material being waterproof.

The advantage of this is that is that a layer of waterproof insulating material is provided adjacent the external skin of the van body where punctures are most likely to occur but by making part of the insulating portion from a non-waterproof and therefore cheaper insulating material, the cost of the member is reduced. It is important that the two materials have similar mechanical behaviour characteristics since they will act together when loaded. If they did not do this, additional stresses would be introduced into the member

and there would be a danger of the two layers moving apart and weakening and/or distorting the member. Preferably the two insulating materials also have similar thermal behaviour characteristics for the same reason.

Preferably the ratio of the proportions of the first insulating material to the second insulating material is between 1 to 4 and 1 to 1. It has been found that the thickness of the waterproof insulating material can be as little as 25% of that of the insulating portion without loss of the improved properties.

Suitably the member has a fourth layer which defines at least part of the interior surface of the van body. The first and fourth layers may be formed from plywood or a metal or a metal alloy and can be coated with a reinforced plastics material to increase the moisture resistance of the member.

Expanded polyvinyl chloride is a particularly preferred first insulating material. It is waterproof and in addition has good mechanical and thermal properties, in particular, it has a high strength to weight ratio and a high softening temperature and is a good insulator. The polyvinyl chloride therefore not

only prevents ingress of water but also protects the second insulating material from the effects of external heat . For example, in a preferred embodiment where polyvinyl chloride is employed with polystyrene which has a low softening temperature, the polyvinyl chloride allows the use of the polystyrene in environments where the polystyrene could not be used alone because of the softening which would have occurred.

The invention will now be further described by way of example with reference to the accompanying drawing which is a section through part of a member in accordance with the invention.

The member 2 has four layers, two of which, 4 and 6, are skins. Skin 4 forms part of the interior surface of the van body while skin 6 forms part of the exterior surface. The skins may be formed from either plywood, or a reinforced plastics material such as glass reinforced polyester, or a metal such as aluminium or a metal alloy such as steel. When the skins are formed from plywood or a metal or metal alloy they are preferably coated with a reinforced plastics material to increase moisture resistance of the member 2.

Between the two skins are two further layers 8 and 10 both of which are formed from an insulating

material. The layer 8 which is closest to the exterior skin 6 is formed from a foamed plastics material which is a waterproof insulating material, preferably expanded polyvinyl chloride. Layer 10 is also formed from a foamed plastics material suitably either polystyrene or polyurethane.

The layers 4, 6, 8 and 10 may be secured together with adhesive or the two skins 4 and 6 may be held in a spaced relationship and the foamed plastics materials injected in between. The exterior skin 4, which is the most likely to be damaged may be formed in short sections held in place by clips 12 embedded in insulating material layer 8. These clips allow a damaged section of the exterior skin to be removed and replaced without necessitating replacement of the whole panel.

With the materials set out above, satisfactory insulation is achieved with a panel thickness of about 60 mm. The width of the layer 8 of waterproof insulating material may be between 12 and 30 mm.

The panel 2 exhibits all the advantages of employing expanded polyvinyl chloride, that is, good water and heat resistance and high strength whilst still being relatively inexpensive to manufacture.

CLAIMS:

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1. An insulated body member for a refrigerated vehicle or container having at least three layers, a first layer which defines at least part of the exterior surface of the vehicle or container, a second layer formed from a first insulating material and a third layer formed from a second insulating material, the second layer being located between the first and third layers, wherein the two insulating materials have similar mechanical behavioural characteristics and the first insulating material is waterproof.
2. An insulated body member as claimed in Claim 1 wherein the two insulating materials have similar thermal behavioural characteristics.
3. An insulated body member as claimed in either Claim 1 or Claim 2 wherein the ratio of the thickness of the second layer to that of the third layer is between 1 to 4 and 1 to 1.
4. An insulated body member as claimed in any preceding Claim wherein a fourth layer is provided which defines part of the interior surface of the van body.
5. An insulated body member as claimed in Claim 4 wherein the fourth layer is formed from plywood or a metal or a metal alloy.

6. An insulated body member as claimed in any preceding Claim wherein the first layer is formed from plywood or a metal or a metal alloy.
7. An insulated body member as claimed in either Claim 5 or 6 wherein the plywood or metal or metal alloy is coated with a reinforced plastics material.
8. An insulated body member as claimed in any preceding Claim wherein the first insulating material is a foamed plastics material.
9. An insulated body member as claimed in any preceding Claim wherein the first insulating material is expanded polyvinyl chloride.
10. An insulated body member as claimed in any preceding Claim wherein the second insulating material is either polystyrene or polyurethane.
11. An insulated body member substantially as herein described with reference to the accompanying drawings.